

# REPORT DOCUMENTATION PAGE

Form Approved  
OMB No. 0704-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing this collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports (0704-0188), 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. **PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.**

<b>1. REPORT DATE (DD-MM-YYYY)</b> <b>18-05-2004</b>			<b>2. REPORT TYPE</b> <b>FINAL</b>			<b>3. DATES COVERED (From - To)</b>		
<b>4. TITLE AND SUBTITLE</b>  <b>Improving Logistics Support for the Combatant Commander</b>			<b>5a. CONTRACT NUMBER</b>					
			<b>5b. GRANT NUMBER</b>					
			<b>5c. PROGRAM ELEMENT NUMBER</b>					
<b>6. AUTHOR(S)</b>  <b>David L. Dias</b>			<b>5d. PROJECT NUMBER</b>					
			<b>5e. TASK NUMBER</b>					
			<b>5f. WORK UNIT NUMBER</b>					
<b>7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)</b>  Joint Military Operations Department Naval War College 686 Cushing Road Newport, RI 02841-1207			<b>8. PERFORMING ORGANIZATION REPORT NUMBER</b>					
			<b>10. SPONSOR/MONITOR'S ACRONYM(S)</b>					
<b>9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)</b>			<b>11. SPONSOR/MONITOR'S REPORT NUMBER(S)</b>					
			<b>12. DISTRIBUTION / AVAILABILITY STATEMENT</b> Distribution Statement A: Approved for public release; Distribution is unlimited.					
<b>13. SUPPLEMENTARY NOTES</b> A paper submitted to the faculty of the NWC in partial satisfaction of the requirements of the JMO Department. The contents of this paper reflect my own personal views and are not necessarily endorsed by the NWC or the Department of the Navy.								
<b>14. ABSTRACT</b> Logistics support to Combatant Commanders has improved significantly since DESERT SHIELD/STORM. DOD logistics has benefited from investments in afloat prepositioning, newer and more capable airlift and sealift platforms, and improvements to mobility infrastructure. Operation Iraqi Freedom (OIF) demonstrated that many logistical challenges still remain. Support units had difficulty keeping pace with a highly mobile combat force. Logistics planners encountered difficulties in meeting unit sustainment demands due to problems with in-transit and total asset visibility (ITV/TAV), which impacted their ability to identify shortages and availability of theater stocks, and pass and track requisitions for critical parts. These impediments prompted decisions to "push" materiel into and throughout the theater preempting the normal requisitioning process. Overall, OIF demonstrated logistics success; however, it also showed that logistics transformation is needed to adapt to future warfare requirements.								
Transformation of DOD logistics must occur with emphasis on linkage of sustainment with operations. Logistics planners need battlefield awareness to enable them to respond to warfighter needs as they occur. Future maneuver warfare will have to rely on a transformed logistics system that can effectively "push" all classes of supply to units in a timely and highly synchronized fashion. This paper will propose a "push" system of supply as part of a migration to a "Sense and Respond" logistics model, which represents the type of transformation that is needed to support 21 <sup>st</sup> century maneuver warfare.								
<b>15. SUBJECT TERMS</b> <b>Department of Defense Logistics</b>								
<b>16. SECURITY CLASSIFICATION OF:</b>			<b>17. LIMITATION OF ABSTRACT</b>		<b>18. NUMBER OF PAGES</b> 23		<b>19a. NAME OF RESPONSIBLE PERSON</b> Chairman, JMO Dept	
<b>a. REPORT</b> UNCLASSIFIED							<b>b. ABSTRACT</b> UNCLASSIFIED	

Standard Form 298 (Rev. 8-98)

**NAVAL WAR COLLEGE  
Newport, RI**

**IMPROVING LOGISTICS SUPPORT FOR  
THE COMBATANT COMMANDER**

**By**

**David, L. Dias  
GS-15, U.S. Transportation Command**

**A paper submitted to the faculty of the Naval War College in partial satisfaction  
of the requirements of the Department of Joint Military Operations.**

**The contents of this paper reflect my own personal views and are not necessarily  
endorsed by the Naval War College or the Department of the Navy.**

**Signature: \_\_\_\_\_**

**18 May 2003**

---

**Faculty Advisor  
COL Georgette Wilson**

## ABSTRACT

Logistics support to Combatant Commanders has improved significantly since DESERT SHIELD/STORM. DOD logistics has benefited from investments in afloat prepositioning, newer and more capable airlift and sealift platforms, and improvements to mobility infrastructure. Operation Iraqi Freedom (OIF) demonstrated that many logistical challenges still remain. Support units had difficulty keeping pace with a highly mobile combat force. Logistics planners encountered difficulties in meeting unit sustainment demands due to problems with in-transit and total asset visibility (ITV/TAV), which impacted their ability to identify shortages and availability of theater stocks, and pass and track requisitions for critical parts. These impediments prompted decisions to “push” materiel into and throughout the theater preempting the normal requisitioning process. Overall, OIF demonstrated logistics success; however, it also showed that logistics transformation is needed to adapt to future warfare requirements.

Transformation of DOD logistics must occur with emphasis on linkage of sustainment with operations. Logistics planners need battlefield awareness to enable them to respond to warfighter needs as they occur. Future maneuver warfare will have to rely on a transformed logistics system that can effectively “push” all classes of supply to units in a timely and highly synchronized fashion. This paper will propose a “push” system of supply as part of a migration to a “Sense and Respond” logistics model, which represents the type of transformation that is needed to support 21<sup>st</sup> century maneuver warfare.

## CONTENTS

<b>Chapter</b>	<b>Page</b>
ABSTRACT.....	ii
Chapter 1-Introduction.....	1
Chapter 2-Operational Lessons Learned.....	2
Operation Iraqi Freedom .....	2
Addressing Logistics Challenges-Establishment of Accountability.....	4
Application of Lessons Learned-Ongoing Initiatives.....	5
Chapter 3-Analysis.....	7
How do we fix the Problem?.....	7
Assessment of Best Commercial Practices.....	8
The Case for a “Push” System of Supply.....	11
Sense and Respond (S&R) Logistics.....	12
Chapter 4-Counterargument.....	14
Chapter 5-Conclusion.....	16
Chapter 6-Recommendations.....	17
NOTES.....	19
BIBLIOGRAPHY.....	22

## **Illustrations**

Figures	Page
U.S. Central Command, Deployment and Distribution Operations Command (CDDOC).....	18

## Chapter 1-Introduction

*“There is nothing more common than to find considerations of supply affecting the lines of a campaign and a war.”*

Carl von Clausewitz

Current Department of Defense (DOD) logistics comprises a “push” and a “pull” system where materiel and supplies are drawn from inventories for delivery to forces, either on a scheduled basis or as they are ordered. Certain sustainment items (e.g., rations, ammunition, petroleum) lend themselves to the “push” system where they are processed and delivered to the consumer on a scheduled basis (weekly, monthly) based on logistics planning factors driven by the size of the force, mission and estimated consumption. The advantage of the “push” system is that it does not use requisitions, which makes process time from the point of sale (request) to the consumer faster. Many other supply items (e.g., repair parts) are ordered from a “pull system” that uses requisitions to pass orders from many sources between numerous organizations. The requisition process is dependent on direct communications between logistics personnel and individual units. Because of a lack of synchronization between transportation and supply functions, and a lack of visibility over requisitions and shipments in the system, particularly in theater, many supply items are ordered multiple times creating a backlog in the supply chain.

Logistics has improved significantly over the past decade because of improvements to the mobility triad (afloat prepositioning, airlift, sealift), transportation infrastructure and in-transit visibility (ITV). Much improvement is still required, consistent with the tenets of Joint Vision 2020 (JV2020), which stresses dominant maneuver through speed, and agility of tailored forces widely dispersed across the battlefield.<sup>1</sup> Operation Iraqi Freedom (OIF)

demonstrated some of the capabilities of 21<sup>st</sup> Century Network-centric Warfare (NCW) and current and future logistical challenges. Logistics systems were unable to keep pace with the operations tempo (OPTEMPO) of OIF. Although there were other factors contributing to these conditions, a key, limiting factor is that DOD's current distribution system (transportation + supply) is fragmented, comprising many different organizations, processes and automated systems, as requests for supply and shipment move between the strategic, operational and tactical levels of war.

Efforts in DOD to transform logistics should progress to a “push” system (vice “push” and “pull”) for all classes of supply. Movement toward the “push” system should begin as part of a systemic approach to a major change in DOD logistics, using best commercial practices in supply chain management. Once implemented, the “push” system should migrate to a “Sense and Respond” (S&R) logistics model, which is also a “push” system, developed by IBM, and currently under evaluation by DOD. This integrated approach to a “push” system is the type of logistics transformation that is needed in DOD to support future NCW. This paper proposes that DOD start developing a “push” system for all supply classes, with transition to “S&R” logistics. Due to the limited scope of this paper, specific methodologies for implementing this transformational change will not be addressed.

## **Chapter 2-Operational Lessons Learned**

### **Operation Iraqi Freedom**

Operation Iraqi Freedom (OIF) was a highly successful military operation by any measure and offered a first glimpse of emerging Network-centric Warfare (NCW) concepts. Overall, there were marked improvements in logistics since DESERT SHIELD/STORM. Nonetheless, the operation was hampered by significant logistics problems, many in the

theater of operations stemming from supply lines stretching hundreds of miles and unable to keep pace with highly mobile forces en route to Baghdad. In addition, many of the same problems that occurred during DESERT SHIELD/STORM were repeated in OIF.<sup>2</sup> These logistical concerns and issues will be highlighted below.

Overall, there was insufficient visibility over equipment and supplies en route to, and particularly within the theater of operations. Radio Frequency Identification (RFID) tags were not consistently used, which degraded Total Asset Visibility (TAV).<sup>3</sup> Logistics planners did not have sufficient access to, nor were they adequately trained in the use of DOD's logistics processes and TAV capabilities because of the existence of multiple automated systems that could not interface with one another.<sup>4</sup> Marine Corps logistics planners noted an inadequate supply system, no standardization of requisitions for supply, too many computer systems and supply officers not familiar with the systems.<sup>5</sup> Problems with ITV contributed to Marine Corps support units' inability to: identify actual shortages; locate supply items within stocks; and pass and track requisitions. These ITV problems resulted in delays, shortages and a lack of critical parts.<sup>6</sup> These conditions prompted decisions to "push" materiel into and throughout the theater, preempting the normal requisition process and impacting ITV.<sup>7</sup>

Theater distribution capability was inadequate to support Reception, Staging, Onward Movement and Integration (RSOI). In many cases, distribution of supplies was delayed because of inadequate trucks and material handling equipment (MHE). The 3<sup>rd</sup> Corps Support Command (COSCOM) had only 150 heavy transport trucks of an estimated 700 required.<sup>8</sup> This shortage of trucks and equipment caused hundreds of pallets and containers to be frustrated at various distribution points without accountability or visibility. Distribution

to units was slow because these containers and pallets lacked content descriptions and proper shipping documentation, and had to be broken down, separated and repackaged several times before they could be delivered to forward units.<sup>9</sup> In addition, combat support and combat service support units (e.g., Army, Marine Corps) arrived in theater well after combat troops, exacerbating the problem and impacting forward distribution. These problems promoted inefficient use of the limited transportation assets in theater and restricted an already stressed supply chain.<sup>10</sup>

Other problems included shortages of critical spare parts (e.g., tires, tank tracks, helicopter spares, radio batteries), causing units to cannibalize vehicles and place numerous duplicate requisitions outside normal supply channels, clogging the supply chain.<sup>11</sup> The USTRANSCOM planners cited insufficient Total Asset Visibility (TAV) as inhibiting the location of cargo in the pipeline and contents of pallets/containers; the sub-optimization of the requisition process drove poor lift decisions (airlift over sealift).<sup>12</sup> Overall, the speed of OIF battlefield operations outpaced U.S. logistics systems.<sup>13</sup>

### **Addressing these Logistics Challenges-Establishment of Accountability**

Many other OIF logistics problems were due to a lack of synchronization of processes comprising many logistics organizations and multiple feeds of sustainment cargo moving through a distribution pipeline without an overall owner. One of the most significant challenges continues to be the forward movement of equipment and supplies from the theater distribution point to the foxhole i.e., *the last tactical mile*. To address accountability for the end-to-end (source of supply to consumer) distribution system, the Secretary of Defense designated (16 September 2003) United States Transportation Command (USTRANSCOM) as DOD's Distribution Process Owner (DPO).<sup>14</sup>

## **Application of Lessons Learned - Ongoing Initiatives**

In view of new DPO responsibilities, and to begin addressing the multitude of OIF lessons learned, TRANSCOM formulated a U.S. Central Command Deployment and Distribution Operations Center (CDDOC) organization (Figure 1) to exercise command and control of theater distribution, and facilitate rapid and seamless logistical support to the warfighter across the Deployment, Employment and Sustainment (DES) continuum. The premise behind CDDOC is that it is a deployable organization that can be adapted to different theaters and missions, and is comprised of transportation and logistics specialists from multiple organizations involved in deployment and sustainment. The CDDOC will enhance synchronization of strategic and theater distribution thus reducing disconnects and delays at key distribution points. This team is currently deployed to CENTCOM's area of operations, working to complete the troop rotation and redeployment involving 240,000 troops and one million short tons of cargo.<sup>15</sup> The group is confirming CENTCOM's deployment and distribution priorities, validating and directing intra-theater airlift support requirements, monitoring and directing intra-theater surface distribution support, and resolving identified CENTCOM distribution shortfalls.<sup>16</sup> This pilot test has confirmed many OIF lessons learned and is addressing these and other issues at the strategic, operational and tactical levels, consistent with USTRANSCOM's new DPO charter. The CDDOC has demonstrated measurable results in the following areas:

- (1) In-Transit Visibility (ITV), Total Asset Visibility (TAV), Tracking: The CDDOC successfully tested iridium satellite tracking devices on a sustainment convoy moving forward from a Theater Distribution Center (TDC) in Doha, Kuwait to a forward point in Balad, Iraq. This device showed real-time TAV capability.<sup>17</sup> They also integrated

strategic level information into a joint distribution computer model increasing cargo visibility and enabling them to track strategic, operational and tactical level movements.<sup>18</sup> Adjustments were made to the airlift flow of 2,500 flak vests for timely delivery to Pakistani forces via two C-130s from Balad to Al Udeid.<sup>19</sup>

(2) Collaborative Planning: The CDDOC established a collaborative planning network (USTRANSCOM, CFLCC, CJTF-7, CJTF-180 etc.) involving discussions of problems at deployment and distribution points through identification and assessment of theater wide IT requirements and the management of integrated IT feeds. They also established teleconferencing capability between DOD logistics planners at the strategic and operational level, reconciling many sustainment issues.<sup>20</sup>

(3) Radio Frequency Identification Tags (RFID): The team coordinated RFID tag-write capability at the TDC and other distribution points that ensured the ITV/TAV of cargo that was reconfigured for onward movement to Iraq.<sup>21</sup>

(4) Distribution Performance: The CDDOC coordinated a significant increase in the number of “pure pallets” assembled for a single theater location. Since the arrival of CDDOC, the number of “pure pallets” arriving in theater is over 90 percent. These “pure pallets” allow shipments to be moved closer to the front, bypassing the TDC where previously, “mixed” pallets had to be broken down and transloaded to other pallets for shipment to the final destination.<sup>22</sup>

(5) Container/Pallet Management: The CDDOC implemented “push” of air pallets diverted from CONUS to Kuwait and then to Iraq (Balad) via surface transportation, synchronizing strategic airlift and theater surface transportation, to smooth the flow and reduce backlog. They also coordinated procedures with Coalition Forces Land

Component Command (CFLCC) to provide visibility over theater container use and later developed plans for those containers accruing detention charges.<sup>23</sup>

The CDDOC pilot is one of the first steps in a long-term process where TRANSCOM will develop insights from which to transform logistics for the regional Combatant Commanders with the goal of synchronizing logistics support between the strategic, operational and tactical level. General John Abizaid, Commander CENTCOM, provided the following comment regarding CDDOC's accomplishments:

CDDOC was able to look upstream in the distribution pipeline in time to divert cargo to less expensive sealift...meeting our requirements and freeing up strategic airlift, an important national force projection enabler, for other national priorities. The lessons learned from the CDDOC pilot will undoubtedly provide CENTCOM and other regional Combatant Commanders with enduring deployment and distribution solutions for the continuing Global War on Terror. I've tested them in the crucible of CENTCOM operations and they have passed with flying colors.<sup>24</sup>

### **Chapter 3-Analysis**

#### **How do we fix the Problem?**

Dr. Milan Vego, a noted military theorist, writes, "Logistics is one of the most important operational functions in support of a major operation and campaign. Its ultimate purpose is to extend the operational reach for one's forces in order to prevent the adversary from extending the operational reach for his own forces."<sup>25</sup> A "push" system of supply can extend the operational reach of a Combatant Commander's forces by providing the right amount of supply as compared to amassing huge stockpiles (iron mountains) in theater that impede logistics support units' efforts to support combat forces, and ultimately impact force maneuver. Key components of a "push" system include the ability to accurately predict materiel and supply requirements based on real-time battlefield awareness and consumption.

A logistics system, supporting the warfighter's 21<sup>st</sup> Century NCW requirements must, therefore, consider elements of operational maneuver and focused logistics as envisioned in Joint Vision 2020 (JV 2020) as follows:

Focused Logistics is the ability to provide the joint force the right personnel, equipment and supplies in the right place, at the right time, and in the right quantity, across the full range of military operations. This will be made possible through a real-time, web-based information system providing total asset visibility as part of a common relevant operational picture, effectively linking the operator and logistician across Service and support agencies. Through transformational innovations to organizations and processes, focused logistics will provide the joint warfighter with support to all functions.<sup>26</sup>

The above statement implies the need to significantly improve, plan, synchronize and manage end-to-end logistics and provide real-time control of the distribution pipeline.<sup>27</sup> Deployment, Employment and Sustainment must be synchronized at all levels, allowing projection of national power where it is needed with emphasis on speed, agility, efficiency, reliability and ITV/TAV. Ongoing DOD efforts should be directed towards distribution based logistics instead of large theater stockpiles of supply.

### **Assessment of Best Commercial Practices**

Commercial industry logistics practices are distribution based with focus on small inventories and speed of delivery to the customer. A "just-in-time" approach to logistics is used in many sectors of the industry (e.g., automobile) where the aim is rapid delivery of parts to the manufacturer within a small delivery window (few hours) supporting rapid assembly of products. Goals include shorter throughput time, small inventories, reliable delivery from point of sale to the consumer, and efficient forecasting and coordination of demand, supply and production.<sup>28</sup> The information technology (IT) supporting these goals integrates suppliers, vendors, managers and customers through global, wireless communications systems with tracking and locating capability, smart machinery for sorting

and distribution, and decision support tools providing real-time visibility and consumption data.<sup>29</sup> These capabilities are also synchronized with a robust transportation system.

Wal-Mart has become the leader in the retail industry for meeting many of the above goals through focus on the customer and gaining a competitive edge through its IT infrastructure. They are the first company to implement RFID technology on all pallets and cases, which will give them TAV of retail goods anywhere in their distribution pipeline.<sup>30</sup> Wal-Mart will implement a plan placing RFID tags on all pallets and cases within the next two years and directed their top one hundred suppliers to develop implementation plans for RFID earlier this year (2004).<sup>31</sup> The DOD followed Wal-Mart's lead and notified its top one hundred suppliers to develop RFID plans.<sup>32</sup> Wal-Mart also shares real-time sales and inventory data with suppliers, and posts that information on its retail website.<sup>33</sup> While the differences between Wal-Mart (seasonal demands, customer preferences, small inventory) and the military (wartime readiness, force structure, larger inventory) are apparent, there are parallels such as collaborative planning and RFID tagging, increasingly employed in military operations, and essential to synchronizing transportation and supply between the strategic, operational and tactical levels.

Other top companies have taken a systemic approach to logistics operations by collaborating internally to integrate sales, forecasting, manufacturing and operations. There is also external collaboration with supply chain partners, customers and suppliers to gain real-time knowledge of point of sale data, the amount of product that should be received, and the location and movement of inventory anywhere in the pipeline. The key to remaining competitive is synchronization and demand planning.<sup>34</sup>

IBM has become an industry leader in event-management tools. They have developed a “Sense and Respond” business model, which helps them adapt quickly to the business environment with the aim of reconciling supply and demand. The demand equation has been approached by studying both the customer and historical data to gain a realistic view of it instead of reliance on forecasts, recognizing there will never be 100 percent accuracy because of unforeseen events. Consequently, the company’s strategy is highly adaptive to uncertainty (higher sales, less production) by quick response through automated resolutions based on business rules e.g., generation of reorders when stocks are low. “Sense and Respond” and similar technologies are still maturing and driving some companies to employ event management strategies as a warning, with humans applying the corrective action.<sup>35</sup>

So the question becomes the relevancy of these commercial capabilities and applications to military operations. Both a “push” and “pull” system exist in industry today. Seemingly, lower inventories tend to favor a “pull” system. In DOD, the accumulation of large stockpiles at theater distribution points inhibits support units’ effectiveness and combat force maneuver. Such stockpiles also negatively impact ITV/TAV because of increased workload of support units. By contrast, an industry “just-in-time” delivery approach, which leans more toward a “pull system”, poses too much risk to the warfighter. This risk is driven by the potential loss of lives in battle and a Commanders’ ability to seize the initiative from the enemy. A Commander cannot afford the slightest chance that materiel and supplies will be delivered late. Neither large theater stockpiles nor minimal inventories are desirable for military operations. Rather, a balanced approach, somewhere between huge stockpiles and minimal inventories (industry model) that allows for a small safety margin, is more conducive to military operations that require flexibility and agility. The key to addressing

this problem is an enterprise based IT architecture that integrates multiple existing systems aimed at fewer, more capable systems that are interoperable, and considers deployment and sustainment from an end-to-end perspective. As in commercial industry, military leaders need to know where supply items are in the distribution system at any given time. Consequently, ITV/TAV, RFID, real-time predictive capability regarding consumption to support force and sustainment requirements, decision support tools, collaborative planning and assured communications at all levels, are essential components of a solution.<sup>36</sup> The DOD logistics goal should be a holistic and seamless solution of shared situational awareness with linkage between all DOD logistics functions, processes and organizations (suppliers, vendors, transporters, logisticians, warfighters) from the strategic to the tactical level and, consistent with Joint Vision 2020, using best commercial practices.<sup>37</sup>

### **The Case for a “Push” System of Supply**

As discussed above, the Commander in the field must have just the right amount of materiel and supply to support operations, which considers a small safety margin to address uncertainty that stems from the fog and friction of war. The benefits of a “push” system are that there will be a continuous steady flow of sustainment in the distribution pipeline supporting the operational and tactical levels of warfare. This steady flow of sustainment allows planners to synchronize strategic, operational and tactical level transportation to provide Combatant Commanders with time definite delivery of the right amount of materiel and supply when and where it is needed. This synchronization can occur because the “push” system is a proactive system that is based on highly accurate forecasting of sustainment requirements as opposed to waiting for a requisition to come from the theater. Military operations would, therefore, be synchronizing DES because the transportation and supply

functions are integrated with operations. Because the “push” system is proactive in nature, supply chain management and ITV/TAV would be improved because logistics planners would know what and how much materiel is in the distribution system at any given time, because they initiated the transaction and made the transportation arrangements. The “push” system fully integrates transportation and supply functions, which, while underway in DOD, is not the case today.

As discussed in the previous section, commercial companies have shown success in synchronizing their business operations with their supply chain. This synchronization is a result of the collaboration that occurs internally and externally, real-time awareness of consumption and production of products, ITV/TAV, and integration of transportation and supply. These same capabilities are underway in DOD as JV2020 efforts continue to evolve and as USTRANSCOM executes its new DPO responsibilities. The “push” system will eventually be able to leverage many of these same capabilities including full implementation of RFID. Once a “push” system is developed in DOD, the warfighter will have more confidence that required shipments will arrive in time and thus numerous requisitions for the same supply item will cease. Combatant Commanders will also benefit from an optimization of transportation assets, which will enhance time definite delivery.

### **Sense and Respond (S&R) Logistics**

The S&R logistics model is adaptive and, as envisioned, dispersed units maneuver deep into the objective area and are logically supported by each other (cross-service supply). Logistical decision authority is authorized at the tactical level. Adaptation is possible because intelligence, operations and logistics are networked through a common operating picture of the battlespace. Key support elements of this approach are a single comprehensive

IT architecture and TAV through full use of RFID on modular, configured loads that transmit their location to the logisticians' computer databases. Force locations would be accessible to logistics support units through a "Blue Force Tracker", resident in the common operating picture.<sup>38</sup>

The basis of the S&R approach is that it is a long-term initiative, and that it is the future "push" system that will build on and enhance the one discussed above. This approach would evolve from the IBM business model just described. The technology and capability of logistics systems must parallel that of a 21<sup>st</sup> century NCW force. The goal is timely delivery of *sufficient* materiel to the warfighter. The NCW force and Effects Based Operations (EBO) transformational capabilities imply on-the-fly reprioritization of joint (inter-service) capability packages and force to objective maneuver (FTOM), without use of Intermediate Staging Bases (ISBs) and RSOI.<sup>39</sup> Rapid force maneuver and networked warfare demands a logistics system that is extremely agile and adaptable, therefore, the S&R capabilities also reflect continuous DES through a non-contiguous battle space with no secure rear areas.<sup>40</sup>

At the strategic level, S&R logistics parallels NCW in that it is knowledge-driven and based on advanced command, control, communications, computers, intelligence, sensors and reconnaissance capabilities that are highly networked. This capability supports real-time battlefield situational awareness where intelligence, operations and logistics are networked.<sup>41</sup> The ability to accurately track and forecast operating units' supply and sustainment needs and meet them in a timely manner from any source (e.g., en route or through any unit in the area) that is able to provide it, is a key element of S&R. Inherent in the common operating picture is the "sensing" function where intelligence, operational and logistics staffs have awareness of the current and future battlespace, including future actions. In essence,

logisticians see the same battlespace as the Commanders and, through continuous electronic communications (vertically, horizontally) with other logisticians and units, become aware of specific logistics requirements.<sup>42</sup>

The “*respond*” function refers to synchronized transportation arranged by logisticians in coordination with other unit staffs. The unique feature of this function is that delivery to the consumer (tactical level) can be by a particular unit logistical staff or a similar one, across service lines, that has available inventory. Cross-service delivery of supply is enhanced through configured or standard loads. This kind of distribution is characterized as “self-synchronization” which is dependent on full ITV/TAV.<sup>43</sup>

The S&R capability provides the Combatant Commander with an end-to-end distribution based logistics system with increased readiness of combat units. The result is potentially shorter combat operations due to a faster OPTEMPO, made possible because logistics is networked with the operation, promoting more efficient use of battlefield stocks through more supply options.<sup>44</sup> There would be no more large theater stockpiles of supply impeding the maneuver of units or making lucrative targets for enemy forces.

## **Chapter 4-Counterargument**

Migration to S&R logistics entails transformational change. A case can be made to maintain the current DOD “push” and “pull” system and fix the existing problems through enhancements to ITV/TAV, and more interaction between transportation, logistics and automated systems specialists (e.g., CDDOC). Without question, maintaining and enhancing the current system is a faster and less costly approach to addressing logistics improvement. Because the current system has been in existence for so many years, DOD planners are generally familiar with processes and procedures. As OIF showed (Chapter 2), however,

there were still many planners that were not well trained in current DOD processes. Another benefit to maintaining the current approach is that individual Services' logistics support is oriented on a “pull” system that is highly dependent on automated systems and rapid end-to-end distribution.<sup>45</sup> However, the “pull” system is generally used for those supply items with varying usage rates.<sup>46</sup> Because it is normally *critical* items (e.g., repair parts) that have varying usage rates and are thus requested via this “pull” system (using requisitions), time definite delivery to the requesting unit is often delayed due to longer processing time from request to fill. These delays were apparent in OIF, as support units had to “push” items to the tactical level to meet shortages of critical parts. As previously discussed, OIF showed improvements over DESERT SHIELD/STORM (DS/DS) but much of it stemmed from the acquisition of newer and more capable airlift and sealift platforms, which suggests that many more improvements are required to attain DOD logistics transformation. Moreover, as Chapter 2 discusses, many of the same DS/DS problems carried over to OIF, pointing to the more transformational approach to DOD logistics.

The benefit to the migration to S&R logistics is that it is a joint solution consistent with future warfare concepts (JV2020, NCW). The S&R leverages proven commercial practices and military cross-service supply concepts, and technology that link intelligence, operations and logistics in networked fashion. This networking facilitates the linkage of transportation and supply functions. The result will be a reduced overall logistics footprint in theater addressing the vulnerability of the long supply lines experienced during OIF. It also sets the stage for the optimization of transportation assets, in particular, the use of more sealift, which brings significant capacity and capability to the fight. However, sealift is often dismissed as an option because requisition transactions take away valuable time in the decision window,

causing it to be dismissed as an option in favor of airlift, due to long sea lines of communication. A “push” system will also be more efficient and enhance force readiness by providing faster and more reliable sustainment to combat forces. This efficiency is possible because intelligence, operations and logistics are highly networked which increases ITV/TAV and gives logisticians battlefield awareness. These conditions would allow logisticians to “push” materiel and supplies on a schedule basis to units, initially based on planning factors, and then in real-time because of this battlefield awareness.

### **Chapter 5-Conclusion**

Operation Iraqi Freedom and the Global War on Terrorism are strong indicators of the type and levels of warfare in 21<sup>st</sup> century NCW. This change in U.S. military warfare requires a logistics system that is dynamic and can adapt to ensure the warfighter gets the appropriate level of materiel and supply when and where it is needed. Logistics must be an enabler not an inhibitor to military operations.

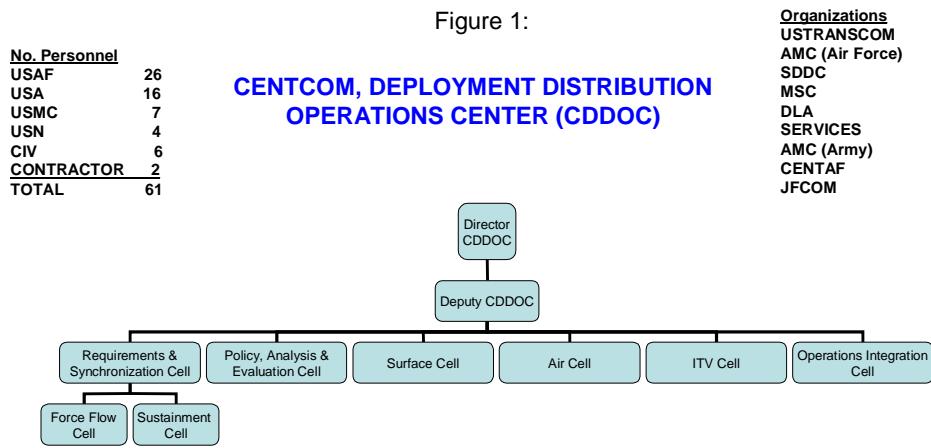
The current DOD logistics system is cumbersome and is unable to adapt to modern warfare. The United States Transportation Command, in coordination with DOD, needs to proactively transform DOD logistics consistent with JV2020 and 21<sup>st</sup> Century NCW. This effort entails leveraging best commercial practices towards building a single IT architecture that provides full ITV/TAV, as a key step in the migration to an S&R logistics model. The success of CDDOC during the CENTCOM troop rotation demonstrated its significant enabling capability to DOD logistics. The CDDOC organizational construct should be maintained and tailored to regional Combatant Commander scenarios as a force enabler to S&R. This more comprehensive approach is the transformation of logistics that is needed to support future warfighting doctrine.

## **Chapter 6-Recommendations**

Based on the foregoing analysis, the following recommendations are provided:

- (1) USTRANSCOM, in coordination with the Office of the Secretary of Defense (OSD), Joint Staff, U.S. Joint Forces Command, Combatant Commanders, Services, Defense Logistics Agency, and other government agencies, should implement a “push” system for all classes of supply as part of a systemic plan of migration to an S&R logistics model. Further development of distribution based logistics emphasizing a single web-based IT architecture, integrating best commercial practices such as real-time predictive capability for forecasting materiel and supply consumption, full ITV/TAV through implementation of RFID tagging, and global, wireless communications, should be pursued now as part of the migration to S&R logistics.
- (2) USTRANSCOM should institutionalize the CDDOC as a deployable organization enabling migration to the S&R logistics model. The precise size and composition of the organization should be evaluated based on lessons learned from ongoing CENTCOM operations. The CDDOC should play a major role in synchronizing deployment and sustainment between the strategic, operational and tactical levels of warfare.
- (3) USTRANSCOM, in coordination with OSD, the Joint Staff, U.S. Joint Forces Command, Services, and Combatant Commanders, should test, during future exercises and wargames, S&R logistics concepts such as cross-service support and modular loads, as well as some of the CDDOC operational improvements (e.g., pure pallets) that proved successful during CENTCOM operations.

## ILLUSTRATION



**Figure 1: CENTCOM, Deployment and Distribution Operations Command<sup>47</sup>**

## NOTES

---

<sup>1</sup> Joint Chiefs of Staff, Joint Vision 2020, (Washington, DC: June 2000), 20.

<sup>2</sup> General Accounting Office, Defense Logistics: Preliminary Observations on the Effectiveness of Activities During Operation Iraqi Freedom, Report to Congress (Washington, DC: 2003), 2.

<sup>3</sup> *Ibid.* 3.

<sup>4</sup> *Ibid.*

<sup>5</sup> John J. Broadmeadow, "Logistics Support to 1<sup>st</sup> Marine Division During Operation Iraqi Freedom," Marine Corps Gazette, (August 2003): 44.

<sup>6</sup> Edward G. Usher, "Statement," U.S. Congress, House, Armed Services Committee, Logistics Transformation, Hearing before the Subcommittee on Readiness, 30 March 2004, 3.

<sup>7</sup> General Accounting Office, Defense Logistics: Preliminary Observations on the Effectiveness of Activities During Operation Iraqi Freedom, Report to Congress (Washington, DC: 2003), 2.

<sup>8</sup> Science Applications International Corporation, The Sense and Response Logistics Capability and Operation Iraqi Freedom, (MacLean, VA: 2003), 9-10.

<sup>9</sup> General Accounting Office, Defense Logistics: Preliminary Observations on the Effectiveness of Activities During Operation Iraqi Freedom, Report to Congress (Washington, DC: 2003), 3.

<sup>10</sup> *Ibid.*

<sup>11</sup> *Ibid.* 4-5.

<sup>12</sup> U.S. Transportation Command, Operation Iraqi Freedom Lessons Learned, (Scott Air Force Base, IL: 2003): 1-2.

<sup>13</sup> Henry S. Kenyon, "Defense Supply System to Out-Maneuver a Flexible Enemy," SIGNAL Magazine, (February 2004): 2.

<sup>14</sup> Robert T. Dail, "Statement," U.S. Congress, House, Armed Services Committee, Logistics Transformation, Hearing before the Subcommittee on Readiness, 30 March 2004, 1.

<sup>15</sup> *Ibid.* 3.

<sup>16</sup> *Ibid.*

<sup>17</sup> U.S. Central Command, Deployment Distribution Operations Center (CDDOC) Situation Report (MacDill Air Force Base, FL: March 2004), 1.

<sup>18</sup> U.S. Transportation Command, CDDOC has big job in CENTCOM's AOR (Scott Air Force Base, IL: April 2004), 4.

<sup>19</sup> U.S. Central Command, Deployment Distribution Operations Center (CDDOC) Situation Report (MacDill Air Force Base, FL: April 2004), 2.

---

<sup>20</sup> U.S. Transportation Command, CDDOC has big job in CENTCOM's AOR Scott Air Force Base, IL: April 2004), 5.

<sup>21</sup> Ibid.

<sup>22</sup> Ibid.

<sup>23</sup> Ibid.

<sup>24</sup> Robert. T. Dail, Joint Theater Logistics: CENTCOM Deployment Distribution Operations Center Brief, (Washington, DC: May 2004)  
<<http://www.amc.army.mil/ausa/spring200.pdf>>, 1 May 2004.

<sup>25</sup> Milan Vego. Operational Warfare. Newport, RI: Naval War College, 2000, 272.

<sup>26</sup> Joint Chiefs of Staff, Joint Vision 2020, (Washington, DC, June 2000), 24.

<sup>27</sup> Ibid.

<sup>28</sup> Randall M. Bentz, Leap-Ahead Logistics Management Technology: Turning the Evolution in Military Logistics into a True Revolution, (Fort Leavenworth, KS: 3 May 1999), 28-30.

<sup>29</sup> Ibid.

<sup>30</sup> Amy Johnson, “35 Year of IT Leadership: A New Supply Chain Forged”, Computerworld, 30 (September 2002): 2.

<sup>31</sup> LogisticsTODAY, Top Ten Supply Chains, (Washington, DC, 2004), 7  
<[www.logisticstoday.com/ASP/viewArticle.asp](http://www.logisticstoday.com/ASP/viewArticle.asp)>, 10 May 2004.

<sup>32</sup> Ibid, 7.

<sup>33</sup> Amy Johnson, “35 Year of IT Leadership: A New Supply Chain Forged”, Computerworld, 30 (September 2002): 2.

<sup>34</sup> Robert J. Bowman, “Best Practices Minimize the Luck Factor in Supply Chain Planning”, Global Logistics and Supply Chain Strategies, (January 2004), 1-3.

<sup>35</sup> Ibid, 5.

<sup>36</sup> Randall M. Bentz, Leap-Ahead Logistics Management Technology: Turning the Evolution in Military Logistics into a True Revolution, (Fort Leavenworth, KS: 3 May 1999), 24-27.

<sup>37</sup> Ibid, 30.

<sup>38</sup> Lexington Institute, From Factory to Foxhole: The Transformation of Army Logistics, (Arlington, VA: 2004), 16.

<sup>39</sup> Linda Lewandowski, “Sense and Respond Logistics Brief,” Office of Force Transformation, (Washington, DC: 6 August 2003).

<sup>40</sup> Department of Defense, Report on Operational Sense and Respond Logistics: Co-evolution of an Adaptive Enterprise Capability (Washington, DC: 2003), 2.

---

<sup>41</sup> Lexington Institute, From Factory to Foxhole: The Transformation of Army Logistics, (Arlington, VA: 2004), 15-16.

<sup>42</sup> Ibid, 16.

<sup>43</sup> Ibid.

<sup>44</sup> Linda Lewandowski, "Sense and Respond Logistics Brief," Office of Force Transformation, (Washington, DC: 6 August 2003).

<sup>45</sup> Joint Chiefs of Staff, Joint Doctrine for Logistics Support of Joint Operations, Joint Pub 4-0 (Washington, DC: 6 April 2000), III-6.

<sup>46</sup> Ibid.

<sup>47</sup> U.S. Central Command, Deployment Distribution Operations Center (CDDOC) Situation Report (MacDill Air Force Base, FL: March 2004), 7.

---

## BIBLIOGRAPHY

Bentz, Randall M. Leap-Ahead Logistics Management Technology: Turning the Evolution in Military Logistics into a True Revolution. Fort Leavenworth, KS: Army Command and General Staff College, May 1999.

Bowman, Robert, J. "Best Practices Minimize the Luck Factor in Supply Chain Planning." Global Logistics and Supply Chain Strategies, (January 2004): 1-3.

Broadmeadow, John J. "Logistics Support to 1<sup>st</sup> Marine Division During Operation Iraqi Freedom." Marine Corps Gazette, (August 2003): 44.

Dail, Robert T. Joint Theater Logistics: CENTCOM Deployment Distribution Operations Center Brief. (Scott Air Force Base, IL: May 2004).  
<<http://www.amc.army.mil/ausa/spring200.pdf>> 1 May 2004.

Johnson, Amy, "35 Year of IT Leadership: A New Supply Chain Forged." Computerworld, 30 (September 2002): 2.

Kress, Moshe. Operational Logistics: The Art and Science of Sustaining Military Operations. Boston, MA 2002.

Lewandowski, Linda. "Sense and Respond Logistics Brief". Office of Force Transformation, Washington, DC: 6 August 2003.

Lexington Institute. From Factory to Foxhole: The Transformation of Army Logistics. Arlington, VA: 2004.

LogisticsTODAY, "Top Ten Supply Chains". (Washington, DC, 2004), 7  
<<http://www.logisticstoday.com/ASP/viewArticle.asp>> 10 May 2004.

Matthews, James K. and Cora J. Holt, So many, So Much, So Far, So Fast. Scott Air Force Base, IL: U.S. Transportation Command, September 1996.

Montcrief, Keith W. Creating a Theater-based Operational Link between Strategic Mobility and Theater Level Logistics for the Joint Task Force Commander. Newport, RI: Naval War College, 2003.

Pigee, Audre G. Transformation-Revolution in Military Logistics. Carlisle Barricks, PA: Army War College, 2002.

Science Applications International Corporation. The Sense and Response Logistics Capability and Operation Iraqi Freedom. MacLean, VA: 2003.

---

U.S. Central Command. Deployment Distribution Operations Center (CDDOC) Situation Report. MacDill Air Force Base, FL: 2004.

U.S. Congress. House. Committee on Armed Services. Logistics Transformation: Hearing before the Subcommittee on Readiness. 30 March 2004.

U.S. Department of Defense. Report on Operational Sense and Respond Logistics: Co-evolution of an Adaptive Enterprise Capability. Washington, DC: 2004.

U.S. General Accounting Office. Defense Logistics: Preliminary Observations on the Effectiveness of Activities During Operation Iraqi Freedom. Report to Congress: Washington, DC: 2003.

U.S. Joint Chiefs of Staff. Joint Doctrine for Logistics Support of Joint Operations. Joint Pub 4-0. Washington, DC: 6 April 2000.

U.S. Joint Chiefs of Staff. Joint Vision 2020. Washington, DC: June 2000.

U.S. Transportation Command. CDDOC has big job in CENTCOM's AOR. Scott Air Force Base, IL: 2004.

U.S. Transportation Command. Operation Iraqi Freedom Lessons Learned. Scott Air Force Base, IL: 2003.

Vego, Milan. Operational Warfare. Newport, RI: Naval War College, 2000.

---